Sparsification

Goal

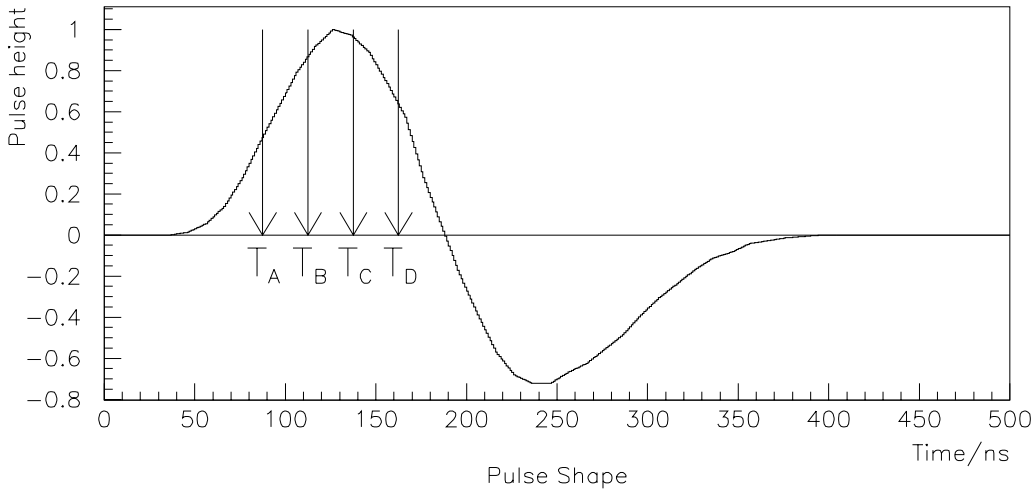
- Zero suppression of channels without a hit.
- Removal of wrong-time pulses.

Selection Algorithm

The sparsification algorithm works with four time samples per channel: A, B, C, and D. The requirements are:

- B>Threshold and C>Threshold.
- B>A (rising slope) and C>D (falling slope).

Pulse Shape and Sample Times

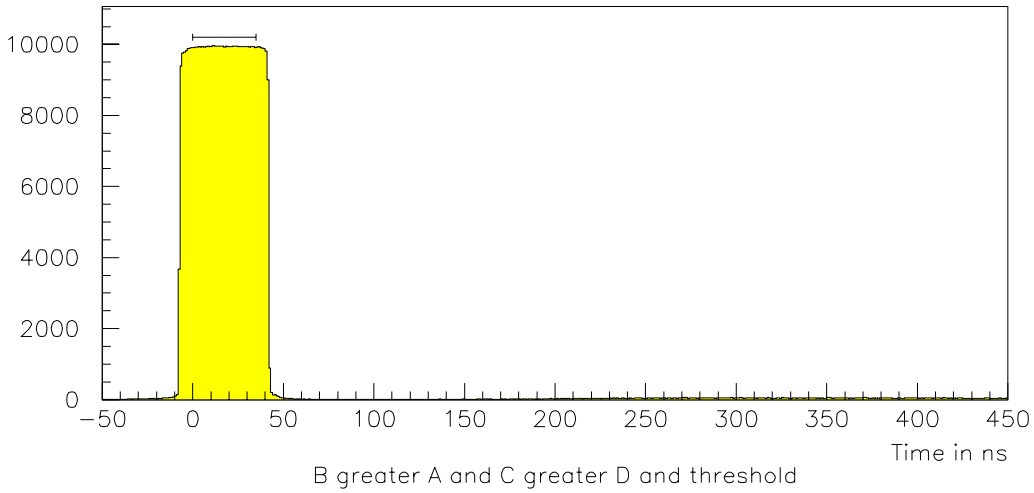


Sparsification

Simulation

- Simulation of 10000 pulses per nano second with start times ranging from 50 ns after the trigger to 450 ns before the trigger.
- Plot shows number of pulses that pass the selection criteria.

Selection Efficiency vs. Time

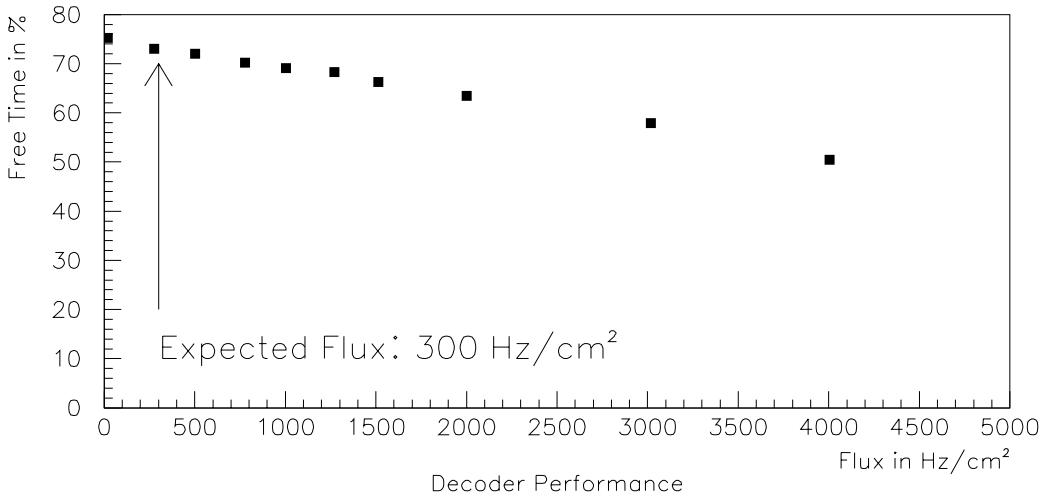


- Selection window 50 ns FWHM (Two time samples).
- Almost 100% efficiency for drift times from 0 to 35 ns.
- Strong suppression of wrong-time pulses.

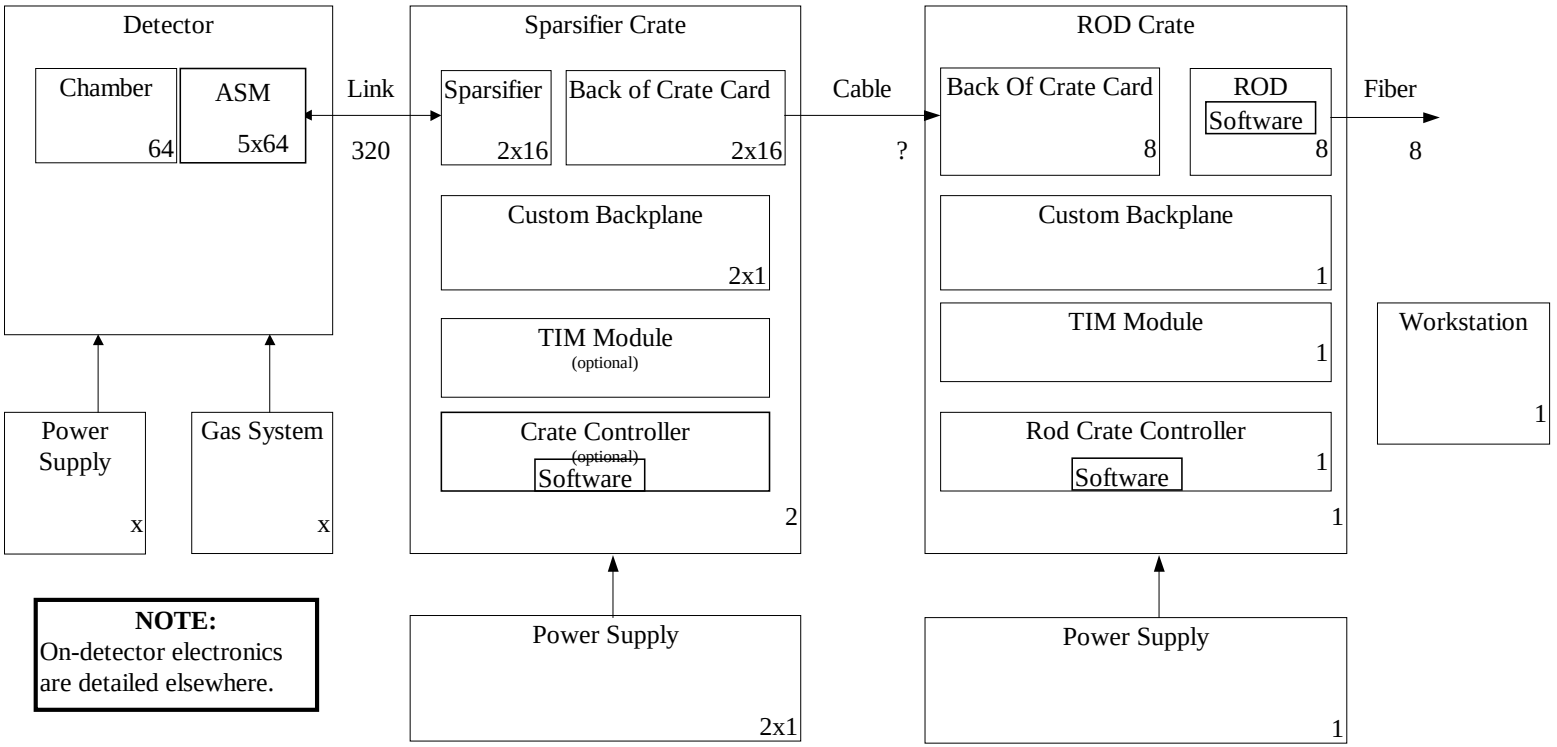
ROD Simulation

- The data of 5000 simulated events is fed into the input FIFO of the decoder at a constant rate to simulate the data stream from the sparsifier.
- The decoding consists of error checking, reformatting, and application of pedestal and gain constants.
- The plot shows the amount of "free time" in which the decoder waits for new input.
- The free time can be used for monitoring, neutron rejection, etc.

Free Time vs. Flux



CSC Detector System Overview



Sparsifier Block Diagram